where α and β are the roots of the equation $x^2-4x+1=0$.

Taking the differences of the $\tan^{-1}$ function of the reciprocals of the convergents, we have

$$\tan^{-1}\frac{1}{1}-\tan^{-1}\frac{3}{5}=\tan^{-1}\frac{1}{4}$$

$$\tan^{-1}\frac{3}{5}-\tan^{-1}\frac{11}{19}=\tan^{-1}\frac{1}{64}$$

$$\tan^{-1}\frac{11}{19}-\tan^{-1}\frac{41}{71}=\tan^{-1}\frac{1}{900}$$

$$\tan^{-1}\frac{41}{71}-\tan^{-1}\frac{153}{265}=\tan^{-1}\frac{1}{12544}$$

. . . . . .

$$\tan^{-1}\frac{u_n-u_{n-1}}{n_n+u_{n-1}}-\tan^{-1}\frac{u_{n+1}-u_n}{u_{n+1}+u_n}=\tan^{-1}\frac{1}{4u_n^2}$$

. . . . . .

Adding, we have

$$\tan^{-1}\frac{1}{1}-\tan^{-1}\frac{1}{\sqrt{3}}=\frac{\pi}{4}-\frac{\pi}{6}=\frac{\pi}{12}=\tan^{-1}\frac{1}{2^2}+\tan^{-1}\frac{1}{8^2}+\tan^{-1}\frac{1}{30^2}+\ldots$$

$$+\tan^{-1}\frac{1}{(2u_n)^2}+\ldots$$

PROBLEMS FOR SOLUTION.

ALGEBRA.

360. **Proposed by CHARLES C. GROVE, Columbia University, New York.**

A bridge club of 28 members has 27 meetings. There are 7 tables with 4 members at each table. Can the players be so arranged that at the end of the season (27 meetings) each member will have played *with* every other member one game and *against* every other member two games, one game meaning one meeting; and how?

361. **Proposed by C. E. GITHENS, Ph. D., Wheeling, W. Va.**

Find three integral values for $[-10+9\sqrt{(-3)}]^{\frac{1}{3}}+[-10-9\sqrt{(-3)}]^{\frac{1}{3}}$. A solution not involving a cubic is desired.

362. Proposed by JAMES F. LAWRENCE, Stillwater, Okla.

Show that the number of solutions in positive integers, zero included, of the equation $x+2y+3z=6n$, is $3n^2+3n+1$.

GEOMETRY.

393. Proposed by S. LEFSEHETZ, Clarke University.

Draw a triangle having a given angle, and with its vertices on three given concentric circles.

394. Proposed by W. J. GREENSTREET, M. A., Editor, The Mathematical Gazette, Stroud, England.

The joins of the excentres to the corresponding vertices of the pedal triangle are concurrent.

395. Proposed by V. M. SPUNAR, M. and E. E., Chicago, Ill.

From a point P without a rectangular field ABC the distances PA, PB, PC measured to the corners are respectively 70, 40, 60 chains. What is the area of the field?

CALCULUS.

316. Proposed by C. N. SCHMALL, New York City.

$$\int_0^\infty \frac{\cos ax}{1+x^2}dx=\tfrac{1}{2}\pi e^{-a}=\int_0^\infty \frac{x\sin ax}{1+x^2}dx.$$

(From Bromwich, *Theory of Infinite Series*, p. 442, ex. 5, and also from Carslaw, *Fourier's Series*, p. 113, ex. 12.) Prove this by any method.

317. Proposed by C. N. SCHMALL, New York City.

A generating line of a right circular cylinder passes through the center of a sphere. The diameter of the cylinder is less than the radius of the sphere. Show that the surface of the cylinder included within the sphere is given by an elliptic integral.

MECHANICS.

263. Proposed by C. N. SCHMALL, New York City.

A railroad car is rounding a curve of radius r with a velocity v, $2d$ being the distance between the rails. If h be the height of its center of gravity above the rails, and g have its usual meaning, show that the weight of the car is divided between the outer and inner rails in the ratio $\frac{dgr+v^2h}{dgr-v^2h}$.

264. Proposed by W. J. GREENSTREET, M. A., Editor, The Mathematical Gazette, Stroud, England.

Three particles, weights ω_1, ω_1, ω_2, and three light strings of equal length connecting them, lie in a vertical smooth circular tube. Discuss the possible positions of stable and unstable equilibrium. If a slight displacement takes place in the unstable position, find the maximum ensuing velocity.